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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/069,900	02/26/2002	Hisaaki Gyoten	10059-410US(P23466-01)	5187

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2005 MARKET STREET, SUITE 2200  
PHILADELPHIA, PA 19103-7013

EXAMINER

ALEJANDRO, RAYMOND

ART UNIT	PAPER NUMBER
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1745

DATE MAILED: 10/29/2003

9

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b> 10/069,900	<b>Applicant(s)</b> GYOTEN ET AL.	
	<b>Examiner</b> Raymond Alejandro	<b>Art Unit</b> 1745	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 22 October 2003.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1,3 and 4 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,3 and 4 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 26 February 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.  
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).  
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                             | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____  |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)         | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ | 6) <input type="checkbox"/> Other:  |

## DETAILED ACTION

### *Response to Amendment*

This office action is in response to the amendment filed 10/22/03. The applicants have overcome the objections and the 35 USC 103 rejection as the Nakamura et al'469 was filed after the applicable priority date of the instant application. The certified translation of record shows sufficient support for the instantly claimed subject matter, hence Nakamura et al's effective date is after the effective date of the present application. However, the instant claims are newly rejected over art for the reasons of record. The rejection is presented anew for the convenience of the applicants.

### *Claim Rejections - 35 USC § 103*

1. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.
2. Claims 1 and 3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tozawa et al 5607785 in view of Saito et al US 2002/0034672.

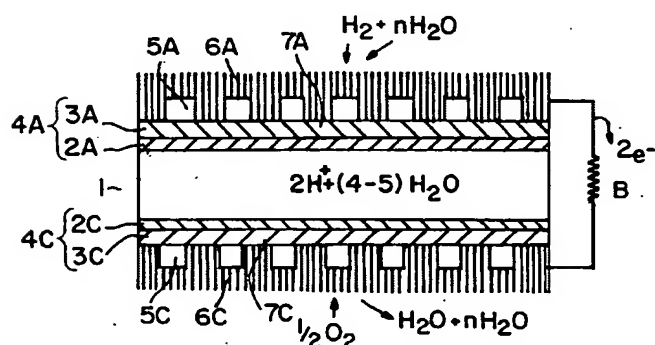
The instant application is directed to a polymer electrolyte fuel cell wherein the disclosed inventive concept comprises the specific electroconductive resin layer on the separator substrate.

#### With respect to claim 1:

Tozawa et al disclose a polymer electrolyte electrochemical cell (title) wherein the electrochemical cell employs a solid polymer electrolyte membrane (ion exchange membrane) (COL 1, lines 7-10). Figure 1 below shows a constitution of a polymer electrolyte fuel cell in which an anode side gas diffusion electrode 4A consisting of an anode side porous catalyst layer

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2A and an anode side current collector layer 3A bonded with each other is bonded to one surface of the ion exchange membrane 1, and an cathode side porous catalyst layer 2C and a cathode side current collector 3C bonded with each other is bonded to the other surface of the ion exchange membrane 1 (COL 1, lines 21-44). A separator 6A having reaction gas supply grooves 5A is in contact with the anode side gas diffusion electrode 4A and current collecting portions 7A are constituted between the adjacent supply grooves 5A of the separator 6A. Similarly, a separator 6C having reaction gas supply grooves 5C is in contact with the cathode side gas diffusion electrode 4C and current collecting portions 7C are constituted between the adjacent supply grooves 5C of the separator 6C (COL 1, lines 21-44). It is disclosed that by connecting both current collector portions 7A and 7C with a load 8, and supplying hydrogen to the anode and oxygen to the cathode, electric power can be taken out through the load 8. *Thus, the separator material is required to be a conductive material.*

**FIG. 1** PRIOR ART

Tozawa et al disclose a solid polymer electrolyte fuel cell according to the foregoing. However, Tozawa et al do not expressly disclose: a) the separator comprising a metal substrate and the specific electroconductive resin layer comprising the specific resin and electroconductive particulate substance and b) the particulate substance comprising vitreous carbon.

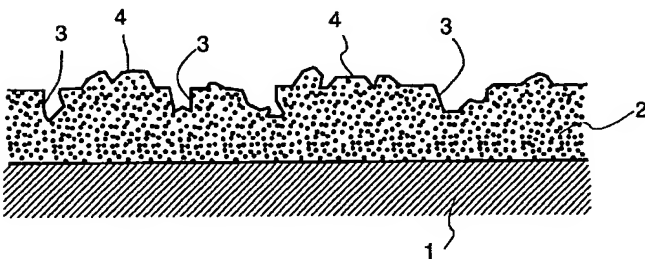
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With respect to claim 1:

Saito et al disclose a fuel cell separator (title/section 0003) which can be used in solid polymer type fuel cell (0007) wherein the separator has a film on the surface (ABSTRACT). It is disclosed that the separator comprises a conductive coating of particular composition on a base material to form on the base material a film made of the conductive coating (SECTION 0020). It is also disclosed that as the base material for fuel cell separator a metal material e.g. titanium, aluminum, stainless steel can be shaped into a separator.

**Figure 1** below shows the separator 1 having a film 2.

Fig.1



The conductive coating comprises a conductive powder and a binder (SECTION 0021). The conductive powder includes, for example, a powder of a carbon material typified by natural graphite, acetylene black, carbon black, etc. (SECTION 0021) wherein the conductive powder have a specific particle diameter (SECTION 0022). The binder used in the conductive coating may be any binder including, for example, thermosetting resin, thermoplastic resin, rubber or the like (SECTION 0023). The thermosetting resin includes, for example, polyamideimide and fluororesin, among others (SECTION 0025). It is noted that polyamideimide resin is a resin having basic radicals.

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*With respect to the specific surface area of the carbon powder, since the recited electroconductive particulate substance (i.e. the carbon powder) covers a very large number of applicable materials which can be used therefor, it is thus contended that Saito et al's conductive coating comprising the conductive powder including, for example, a powder of a carbon material typified by natural graphite, acetylene black, carbon black, etc would produce a separator electroconductive resin layer (the conductive coating) exhibiting the particular specific surface area property or characteristic. For instance, Tables 1-8 of the Saito et al '672 reference show the composition of conductive coating is composed of conductive powders including carbon black, natural graphite and acetylene black. Thus, the prior art's specific embodiment (i.e. the conductive coating and its composition) seems to be identical except that the prior art is silent as to an inherent property and/or characteristic. In that, it is noted that the extrinsic evidence makes clear that the missing descriptive matter is necessarily present in conductive coating described in the reference, and that it would be so recognized by persons of ordinary skill. (Refer to **MPEP 2112 Requirements of Rejection Based on Inherency; Burden of Proof**).*

As to claim 3:

It is disclosed that the conductive coating comprises a conductive powder wherein the conductive powder includes, a powder of a carbon material typified by natural graphite, artificial graphite, carbon black, ketjen black, expanded graphite or the like (SECTION 0021). It is also disclosed that there is no particular restriction as to the kind of the conductive powder as long as the powder is conductive (SECTION 0021). It is further disclosed that as the base material for fuel cell separator a carbon separator material made of glassy carbon can be used (SECTION

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0035). It is noted that glassy carbon is also called vitreous carbon. It is also disclosed that a coated separator material can be obtained by coating the separator material with a noble metal or carbon material and a separator material obtained by combining two or more kinds of the above separator materials (SECTION 0035).

In view of the above, it would have been obvious to one skilled in the art at the time the invention was made to make the separator of Tozawa et al by comprising the specific metal substrate and the specific electroconductive resin layer comprising the specific resin and electroconductive particulate substance of Saito et al because Saito et al teaches that separators for solid polymer type fuel cell are desired to have electrical conductivity and low electrical resistance and the use of Saito et al's specific metal separator and conductive coating of particular composition on the separator improves the electrical conductive and low electrical resistance behavior of the separator. Furthermore, since the separator has a role of transferring the electricity generated as the gas diffusion electrode of the fuel cell to the exterior, those of ordinary skill in the art would be motivated to employ the specific metal separator and conductive film material of Saito et al to obtain a fuel cell separator having enhanced conductivity.

As to the particulate substance comprising vitreous carbon, it would have been obvious to one skilled in the art at the time the invention was made to make the separator of Tozawa et al by comprising the particulate substance comprising vitreous carbon of Saito et al because Saito et al disclose that the conductive coating comprises conductive powder including a powder of a carbon material without particular restriction as to the kind of the conductive powder as long as the powder is conductive. Accordingly, since Saito et al employs glassy carbon to make a

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conducting separator material, those of ordinary skill in the art would be motivated to use an electroconductive particulate substance such as glassy carbon to make the required conducting coating or film on the separator material. Moreover, Saito et al do encompass to use glassy carbon as the electroconductive particulate substance because his disclosure teaches that any kind of conductive powder as long as the powder is conductive can be used in the film as well as the possibility to obtain a coated separator material by coating the separator material with a carbon material with the proviso that the separator as a whole can be obtained by combining two or more kinds of the disclosed separator materials including glassy carbon.

3. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tozawa et al 5607785 in view of Saito et al US 2002/0034672 as applied to claim 1 above, and further in view of the Japanese publication JP 11-126620.

Tozawa et al and Saito et al are applied, argued and incorporated herein for the reasons above.

Note: for purpose of prosecution, the transitional claim language "having" in claim 4 has been interpreted as open-end language.

As to claim 4:

In addition, Saito et al disclose a coated separator base material obtained by coating the base separator material with a noble metal or a carbon material (SECTION 0035). Accordingly, the separator material of Saito et al would include the separator base material wherein the base material is first coated with a noble metal or a carbon material and further having the conductive coating comprising the conductive powder and the resin thereon.



However, neither Tozawa et al nor Saito et al expressly disclose the specific layer material.

The JP'620 publication teaches a separator for a fuel cell constituting a solid polymer type fuel cell comprising a material made by applying a coating layer composed of Sn or WC on a surface the separator material (ABSTRACT).

In view of the above, it would have been obvious to one skilled in the art at the time the invention was made to make the separator layer of Tozawa et al and Saito et al by having the specific layer material of the JP'620 publication as the JP'620 publication teaches that by applying a coating layer composed of the disclosed specific layer material the separator surface exhibits excellent corrosion resistance characteristics. In addition, the coating layer is high in electroconductivity and thus, current collecting performance is prevented from lowering.

#### ***Response to Amendment***

4. Applicant's arguments with respect to claims 1 and 3-4 have been considered but are moot in view of the new ground(s) of rejection.

#### ***Conclusion***

5. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. This prior art is pertinent because it was cited in an International Search Report. However, the examiner did not find them fully relevant for the following reasons: a) the JP 11-345618 document discloses coating metal separator material for solid polymer fuel cell wherein the passive film is formed on the surface of the plate used as a base material wherein the

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conductive coating film comprises graphite powder and carbon black on a resin, however, the JP'618 document appears to be silent to the first and second electroconductive separator plates having the specific gas channels for supplying a fuel or oxidant gas to the diffusion electrodes.

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Raymond Alejandro whose telephone number is (703) 306-3326. The examiner can normally be reached on Monday-Thursday (8:30 am - 7:00 pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick J. Ryan can be reached on (703) 308-2383. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9310 for regular communications and (703) 872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

Raymond Alejandro  
Examiner  
Art Unit 1745

A handwritten signature in black ink, appearing to read 'RAM', with a long horizontal flourish extending to the right.